The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for determining the thermal expansion coefficient of a substance comprising:

determining at each of two or more temperatures the absolute position in wavelength or frequency represented by multiple resonant interference peaks of a Fabry-Perot etalon whose optical path is defined by said substance and calculating a value of said coefficient from observed difference(s) in said wavelengths or frequencies at said two or more temperatures, said difference(s) being calculated statistically from said multiple resonant interference peaks.

2. (Original) A method of claim 1, where frequency positions are measured.

3. (Original) A method of claim 1, wherein wavelength positions are measured.

4. (Original) A method of claim 1, wherein said Fabry-Perot etalon consists essentially of a solid sample of said substance having highly flat end surfaces.

5. (Original) A method of claim 1, wherein said Fabry-Perot etalon comprises an optical path consisting essentially of said substance and at the ends thereof highly flat plates of a different material.

6. (Currently Amended) A method of claim 1, wherein the change in length (ΔL) of said substance at two different temperatures is calculated from the measured differences ($\Delta \nu$) in ~~respective frequency peak positions~~ the absolute position in frequency represented by multiple resonant interference peaks by the equation:

$$\Delta \nu = \frac{-\nu}{L} \Delta L, \quad (4)$$

where L is the Fabry-Perot gap at the first temperature and ν is the frequency position of the respective peak at said temperature.

7. (Original) A method of claim 1, wherein the frequency peak positions are in the range of 1300 - 1700 nm.

8. (Original) A method of claim 1, wherein the end surfaces of the etalon has $\lambda/20$ flatness or better and <0.5 arc second parallelism or better.

9. (Original) A method of claim 1, wherein the number of said peak positions measured is ten or more.

10. (Original) A method of claim 1, wherein the finesse of the etalon is 1 - 1000.

11. (Currently Amended) A method for determining the thermal expansion coefficient of a substance comprising:

determining at each of two or more temperatures the absolute position in wavelength or frequency represented by multiple resonant interference peaks of a Fabry-Perot etalon whose optical path is defined by said substance and calculating <u>a value of</u> said coefficient from observed difference(s) in said wavelengths or frequencies at said two or more temperatures, wherein said absolute positions are determined by simultaneous reference to a standard having multiple fiducial marks which are overlaid onto etalon based resonances<u>, said difference(s) being calculated statistically from said multiple resonant interference peaks</u>.

12. (Currently Amended) A method for determining the thermal expansion coefficient of a substance comprising:

determining at each of two or more temperatures the absolute position in wavelength or frequency represented by ten or more resonant interference peaks of a Fabry-Perot etalon whose optical path is defined by said substance and calculating <u>a value of</u> said coefficient from observed difference(s) in said wavelengths or frequencies at said two or more temperatures, wherein said

absolute positions are determined by simultaneous reference to a standard having multiple fiducial marks which are overlaid onto etalon based resonances, said difference(s) being calculated statistically from said multiple resonant interference peaks.

13. (Previously Presented) A method of claim 11, wherein the reference standard is a gas standard or a temperature-stabilized Fabry-Perot etalon.

14. (Previously Presented) A method of claim 12, wherein the reference standard is a gas standard or a temperature-stabilized Fabry-Perot etalon.

15. (New) A method of claim 11, where frequency positions are measured.

16. (New) A method of claim 11, wherein wavelength positions are measured.

17. (New) A method of claim 11, wherein said Fabry-Perot etalon consists essentially of a solid sample of said substance having highly flat end surfaces.

18. (New) A method of claim 11, wherein said Fabry-Perot etalon comprises an optical path consisting essentially of said substance and at the ends thereof highly flat plates of a different material.

19. (New) A method of claim 11, wherein the change in length (ΔL) of said substance at two different temperatures is calculated from the measured differences ($\Delta \nu$) in the absolute position in frequency represented by multiple resonant interference peaks by the equation:

$$\Delta \nu = \frac{-\nu}{L} \Delta L , \qquad (4)$$

where L is the Fabry-Perot gap at the first temperature and ν is the frequency position of the respective peak at said temperature.

20. (New) A method of claim 11, wherein the frequency peak positions are in the range of 1300 - 1700 nm.

21. (New) A method of claim 11, wherein the end surfaces of the etalon has $\lambda/20$ flatness or better and <0.5 arc second parallelism or better.

22. (New) A method of claim 11, wherein the finesse of the etalon is 1 - 1000.